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## (54) Optical crossbar network using wavelength division multiplexing and optical crossbar exchange

(57) Including optical transmitters (71) for producing optical signals on different wavelengths, an optical network comprises an optical crossbar exchange (97) for exchanging the optical signals into an exchanged signal, demultiplexers (111) for demultiplexing the exchanged signals into receiver input signals, optical receivers (91) for converting the receiver input signals into electric output signals, and memory units (69) for storing the output signals as their contents and producing at least one of the contents as a reception signal upon request. It is possible to make such an optical network deal with multiplexed optical signals as the above-mentioned optical signals particularly when supplied with multiplexed electric transmission signals to multiplexed optical signal transmitters.

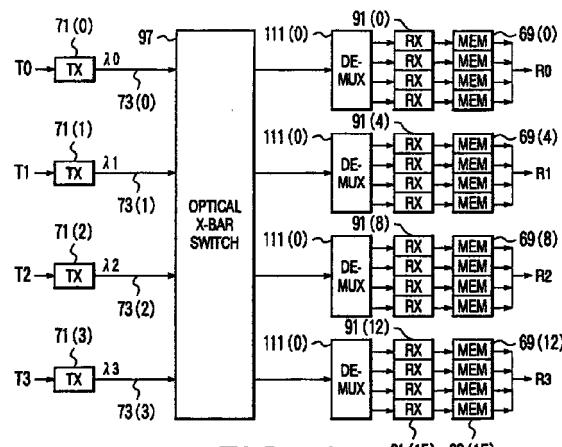


FIG. 4



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	TAI C ET AL: "DYNAMIC RANGE AND SWITCHING SPEED LIMITATIONS OF AN N X N OPTICAL PACKET SWITCH BASED ON LOW-GAIN SEMICONDUCTOR OPTICAL AMPLIFIERS" JOURNAL OF LIGHTWAVE TECHNOLOGY, US, IEEE. NEW YORK, vol. 14, no. 4, 1 April 1996 (1996-04-01), pages 525-533, XP000597069 ISSN: 0733-8724 * figure 1 *	1	H04J14/00 H04Q11/00
Y	JIN Y ET AL: "AN OPTICAL CROSS-CONNECT SYSTEM AS A HIGH-SPEED SWITCHING CORE AND ITS PERFORMANCE ANALYSIS" JOURNAL OF LIGHTWAVE TECHNOLOGY, US, IEEE. NEW YORK, vol. 14, no. 6, 1 June 1996 (1996-06-01), pages 1183-1197, XP000598524 ISSN: 0733-8724	1,20, 24-26	
X	* paragraphs [000I],[00II]; figures 1,7 *	21-23	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
Y	EP 0 639 015 A (NIPPON TELEGRAPH & TELEPHONE) 15 February 1995 (1995-02-15) * column 1, line 5 - line 10 * * column 2, line 7 - line 15 * * column 2, line 35 - line 40 * * column 3, line 1 - line 7 * * column 8, line 1 - line 17 * * figures 2,3,7 *	1,20, 24-26	H04Q H04L
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The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	10 February 2000	Meurisse, W	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone	T : theory or principle underlying the invention		
Y : particularly relevant if combined with another document of the same category	E : earlier patent document, but published on, or after the filing date		
A : technological background	D : document cited in the application		
O : non-written disclosure	L : document cited for other reasons		
P : intermediate document	& : member of the same patent family, corresponding document		



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## EUROPEAN SEARCH REPORT

Application Number  
EP 98 10 0122

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	<p>MOSER L E ET AL: "LOSSLESS PACKET SWITCHING WITH SMALL BUFFERS" IEE PROCEEDINGS: COMMUNICATIONS, GB, INSTITUTION OF ELECTRICAL ENGINEERS, vol. 143, no. 5, 1 October 1996 (1996-10-01), pages 335-340, XP000636930 ISSN: 1350-2425 * figure 2 *</p> <p>-----</p>	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	10 February 2000	Meurisse, W	
CATEGORY OF CITED DOCUMENTS		<p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... &amp; : member of the same patent family, corresponding document</p>	
<p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p>			

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1,20(as dep. on cl. 1)-26



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1,20(as dep. on cl. 1)-26

Optical network including N transmitters and square N receivers.

2. Claims: 2,5,8,11

Optical network including a single crossbar switch

3. Claims: 3,6,9,12

Optical network including P splitter/multiplexers coupled to Q crossbar output switches

4. Claims: 4,7,10,13,20 (as dep. on claims 4,7,13)

Optical network including P primary crossbar switches coupled to Q secondary crossbar switches.

5. Claims: 14,17

Optical network including a wavelength selective single crossbar switch.

6. Claims: 15,18

Optical network including P splitter multiplexers coupled to Q wavelength selective crossbar output switches.

7. Claims: 16,19,20 (as dep. on claims 16,19)

Optical network including P primary crossbar switches coupled to Q wavelength selective secondary crossbar switches.

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 10 0122

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

10-02-2000

Patent document cited in search report	Publication date		Patent family member(s)	Publication date
EP 0639015 A	15-02-1995		JP 7057493 A	03-03-1995
			JP 7079238 A	20-03-1995
			US 5506712 A	09-04-1996